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(21)Application number : 11-068755 (71)Applicant : SONY CORP

(22)Date of filing : 15.03.1999 (72)Inventor : MATSUMOTO KENICHI  
AKIMOTO KATSUJI

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(54) LENS-BARREL

(57)Abstract:

PROBLEM TO BE SOLVED: To prevent a front lens or an image pickup element from being prostrated because of deformation of a main lens-barrel, by centering a front lens-barrel and a rear lens-barrel comprising different members different from the main lens-barrel out to an optical axis utilizing a guide shaft of a lens holding frame.

SOLUTION: One-end parts 9a, 9a of two parallel guide shafts 9, 9 with plural held lens holding frames 6, 7, 8 having movable lenses are press fitted fixedly into press fit bearing holes 10, 10 formed in a front wall face 1a of a main lens-barrel 1 to be penetrated, the other-end parts of the guide shafts 9, 9 are positioned on receiving seats 11, 11 formed in a rear wall 1b of the main lens-barrel 1 to be penetrated, the guide shaft 9, 9 are held on receiving seats 13, 13 by shaft pressing frames 13, 13 provided vertically from a lid lens-barrel 12, and an auxiliary lens-barrel 17 of front lens 16 and an auxiliary lens-barrel 23 of an image pickup element 22 are positioned to

be assembled in the guide shafts 9, 9 projected from the front wall face 1a and the rear wall face 1b of the main lens-barrel 1.

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**CLAIMS**

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[Claim(s)]

[Claim 1] In the lens barrel which two or more lens maintenance frames which have a moving lens at least are held at a guide shaft, and the above-mentioned moving lens was made to be made movable in the direction of an optical axis in accordance with the above-mentioned guide shaft While the 1st bearing device in which press fit support is carried out in the 1 side-attachment-wall side of a primary mirror cylinder, and it was made for the above-mentioned guide shaft to penetrate an end side, and the above-mentioned guide shaft are positioned on the receptacle seat in which the other end side was formed to the other side-attachment-walls side of the above-mentioned primary mirror cylinder and penetrating The 2nd bearing device

which held the above-mentioned guide shaft to the above-mentioned receptacle seat with the axial presser-foot arm, since -- the lens barrel characterized by positioning and attaching an auxiliary lens-barrel to a posterior part using the above-mentioned guide shaft which is constituted and carries out a penetration protrusion from the bearing device of the above 1st, and the 2nd bearing device, respectively in front of on the optical axis of the above-mentioned primary mirror cylinder.

[Claim 2] The lens barrel which carries out press fit support of the auxiliary lens-barrel in a lens barrel according to claim 1 at the above-mentioned guide shaft which carries out a penetration protrusion from the bearing device of the above 2nd, and is characterized by positioning an auxiliary lens-barrel to the convex shaft which projects from the other side-attachment-walls side of the above-mentioned primary mirror cylinder.

[Claim 3] The lens barrel characterized by the above-mentioned auxiliary lens-barrel being a lens-barrel for the lens barrel for a front ball lens, and an image sensor in a lens barrel according to claim 1.

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#### DETAILED DESCRIPTION

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##### [Detailed Description of the Invention]

###### [0001]

[Field of the Invention] This invention enables it to perform easily pin center,large \*\*\*\* of the optical axis of a lens maintenance frame, a lens barrel and a front ball lens, and an image sensor about the lens barrel applied to zoom lens devices, such as a video camera, using the guide shaft of two or more lens maintenance frames which have a moving lens in detail.

###### [0002]

[Description of the Prior Art] There are some which were indicated by patent No. 2775521 as this conventional kind and a configuration of a lens barrel. According to this, two or more lens maintenance frames which constitute the zoom lens device were supported by the guide shaft, and the bearing means of this guide shaft has taken the structure by which a bearing is carried out to the bearing crevice formed in the lens barrel order wall surface.

[0003] Moreover, the image sensor which changes into an electrical signal the photographic subject image which penetrated the front ball lens and the zoom lens device has further structure supported by the posterior part lens-barrel really fabricated by the posterior part of the optical-axis pin center,large of a lens barrel by attaching the front ball lens arranged ahead of the optical-axis pin center,large of a zoom lens device in the anterior part lens-barrel really fabricated by the anterior part

of a lens barrel.

[0004]

[Problem(s) to be Solved by the Invention] By the way, at the conventional lens barrel mentioned above, with the structure where the anterior part lens-barrel for a front ball lens and the posterior part lens-barrel for an image sensor are really fabricated by the lens barrel order part, when \*\*\*\* occurs in a front ball lens or an image sensor according to deformation of a lens barrel etc., a location gap is carried out from an optical-axis pin center,large, and there is a problem that normal image pick-up actuation is spoiled. Moreover, amendment is not easy if \*\*\*\* arises in this front ball lens and image sensor.

[0005] Furthermore, the lens barrel by which the anterior part lens-barrel and the posterior part lens-barrel are really fabricated becomes complicated [ structure ], and, for this reason, has the problem that the manufacture cost of the shaping metal mold of a lens barrel becomes expensive.

[0006] This invention aims at obtaining the lens barrel which cancels \*\*\*\* of a front ball lens or an image sensor, and enabled it to manufacture the shaping metal mold of a lens-barrel cheaply by having been made in order to cancel a technical problem which was mentioned above, using an anterior part lens-barrel and a posterior part lens-barrel as another member with a lens barrel, and having been made to carry out pin center,large \*\*\*\* of an optical axis for an anterior part lens-barrel and a posterior part lens-barrel using the guide shaft.

[0007]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the lens barrel by this invention While carry out press fit support of the end side of the guide shaft with which two or more lens maintenance frames are held in the 1 side-attachment-wall side of a primary mirror cylinder, making it penetrate, being positioned on the receptacle seat in which the other end side of a guide shaft was formed to the other side-attachment-walls side of a primary mirror cylinder and penetrating Receive a guide shaft with an axial presser-foot frame, it is made to hold to a seat, and an auxiliary lens-barrel is positioned and attached to an optical-axis pin center,large using the guide shaft which projects from the wall surface of a primary mirror cylinder.

[0008] Thus, by having constituted, location \*\*\*\* to the optical-axis pin center,large of the auxiliary lens-barrel which makes a guide shaft a shaft basis and is attached to two or more lens maintenance frames and the primary mirror cylinder order section can be performed easily, and since the guide shaft is made into the shaft basis even if deformation of a lens barrel etc. arises, \*\*\*\* of the image sensor with which the front ball lens with which the anterior part auxiliary lens-barrel is equipped, and the posterior part auxiliary lens-barrel are equipped is cancelable for this reason.

[0009]

[Embodiment of the Invention] Hereafter, the example of the gestalt of operation of the lens barrel by this invention is explained with reference to a drawing taking the case of the lens barrel which has a zoom lens device.

[0010] The sectional view of the assembly condition of a lens barrel and drawing 3 of the perspective view in the condition that drawing 1 separated the component of a lens barrel, and drawing 2 are the A-A line sectional views of drawing 2.

[0011] The primary mirror cylinder 1 of a lens barrel has a brake-shoe type configuration mostly by the shape of a semicircle, and the zoom lens device 2 is arranged in this primary mirror cylinder 1. The zoom lens device 2 consists of three lenses, the lens of a center section is the fixed lens 3, the lens by the side of a photographic subject (left-hand side) is a moving lens 4 (BARIETA lens), and the lens at the tail end (right-hand side) is a moving lens 5 (master lens). And each lenses 3, 4, and 5 are held at the lens maintenance frames 6, 7, and 8, respectively, and are supported by two guide shafts 9 and 9 to which each lens maintenance frames 6, 7, and 8 are parallel to the maintenance pawls 6a, 7a, and 8a with which each right and left were equipped by the maintenance cylinders 6b, 7b, and 8b.

[0012] Here, press fit immobilization is carried out at the press fit bearing holes 10 and 10 which the end sections 9a and 9a formed in front wall side 1a of the primary mirror cylinder 1, the axis end penetrates from front wall side 1a, and the guide shafts 9 and 9 constitute the 1st bearing device. Moreover, the other end 9b and 9b of the guide shafts 9 and 9 is supported on the receptacle seat 11 of the shape of V character formed in posterior-wall-of-stomach side 1b of the primary mirror cylinder 1, and 11, and the axis end penetrates it from posterior-wall-of-stomach side 1b. And the receptacle seat 11 and the guide shafts 9 and 9 supported on 11 are held by the axial presser-foot arms 13 and 13 installed from the lid side lens-barrel 12 which stops opening of the primary mirror cylinder 1, and constitute the 2nd bearing device. In addition, the lid side lens-barrel 12 \*\*\*\*s the setscrew 14 inserted in from hole 12a to screw-thread hole 1c of the primary mirror cylinder 1, carries out a stop, and is fixed.

[0013] On the other hand, a window hole 15 is formed in front wall side 1a of the primary mirror cylinder 1, and the auxiliary lens-barrel 17 equipped with the front ball lens 16 used as a photographic subject lens is attached in the front face of this front wall side 1a. That is, after one side inserts two tooling holes 18 and 18 which consist of long holes in the end sections 9a and 9a of the guide shafts 9 and 9 penetrated from front wall side 1a of the primary mirror cylinder 1 and positions them, the auxiliary lens-barrel 17 \*\*\*\*s the setscrew 19 inserted in from hole 17a to the screw-thread hole 20 of front wall side 1a, carries out a stop, and is fixed.

[0014] Moreover, a window hole 21 is formed also in posterior-wall-of-stomach side 1b of the primary mirror cylinder 1, and the auxiliary lens-barrel 23 which equipped the tooth back of wall surface 1b with the image sensor 22 after this is attached. That is,

after one side inserts two tooling holes 24 and 24 which consist of long holes in the other end 9b and 9b of the guide shafts 9 and 9 penetrated from posterior-wall-of-stomach side 1b of the primary mirror cylinder 1 and positions them, the auxiliary lens-barrel 23 \*\*\*\*s the setscrew 25 inserted in from hole 23a to the screw-thread hole 26 of posterior-wall-of-stomach side 1b, carries out a stop, and is fixed.

[0015] In addition, although two moving lenses 3 and 5 of the zoom lens device 2 are not illustrated here, each lens maintenance frame 6 and 8 is made movable in the direction of an optical axis by driving force, such as a pulse motor, and variable power actuation of a zoom lens is performed. Moreover, an iris device forms a slit in the primary mirror cylinder 1 or the lid lens-barrel 12, and insertion of it between the lenses of a zoom lens device is enabled from here.

[0016] The assembly procedure of the lens barrel constituted as mentioned above In the condition of having inserted the lens maintenance frames 6, 7, and 8 in two guide shafts 9 and 9 The other end 9b and 9b of the guide shafts 9 and 9 is once inserted in receptacle seat [ of posterior part wall surface 1b of the primary mirror cylinder 1 ] 11, and 11 side, and press fit immobilization of the end sections 1a and 1a of the guide shafts 9 and 9 is carried out in the condition of having penetrated to the press fit bearings 10 and 10 of anterior part wall surface 1a of the primary mirror cylinder 1. Then, the lid lens-barrel 12 is attached to the primary mirror cylinder 1, the guide shafts 9 and 9 are pressed down and received from a top with the axial presser-foot arms 13 and 13, and it holds to seats 11 and 11. Then, an assembly is completed by positioning and fixing the auxiliary lens-barrel 17 equipped with the front ball lens 16, and the auxiliary lens-barrel 23 equipped with the image sensor 22 with screws to the guide shafts 9 and 9 which project from the primary mirror cylinder 1 order wall surface.

[0017] Thus, the lens barrel by constituted this invention makes two guide shafts 9 and 9 a shaft basis, with pin center,large \*\*\*\* of \*\*, can perform correctly pin center,large \*\*\*\* to the optical axis L of the auxiliary lens-barrel 17 of the front ball lens 16, and the auxiliary lens-barrel 23 of an image sensor 22 to the optical axis L of the lens maintenance frames 6, 7, and 8, and can obtain high optical-character ability easily to it. The front ball lens 16 and an image sensor 22 seem moreover, not to fall, since it is the method by which the auxiliary lens-barrel 17 of the front ball lens 16 and the auxiliary lens-barrel 23 of an image sensor 22 are used as another member, and positioning immobilization is carried out at the wall surface before and behind the primary mirror cylinder 1, and the guide shaft 9 is made into the shaft basis for location \*\*\*\* to an optical axis even if deformation etc. arises in the primary mirror cylinder 1.

[0018] Moreover, since fabrication of the primary mirror cylinder 1 and the two auxiliary lens-barrels 17 and 23 is carried out to an exception object, respectively, the

shaping metal mold of each lens-barrel is simplified, and they can manufacture metal mold cost cheaply.

[0019] Furthermore, since a shaft diameter and die length are using the two same things, the guide shaft 9 has a good guide shaft at one kind, and reduction of components cost can be aimed at.

[0020] As long as it does not limit to a V character configuration as shown in drawing 4 a, and the guide shaft 9 is positioned in the direction of a field perpendicular to an optical axis, the receptacle seat 11 of the guide shaft 9 mentioned above may be the receptacle seat 29 grade of a square groove configuration, as are shown in drawing 4 b, it is shown in the receptacle seat 27 of a U character configuration, and drawing 4 c and it is shown in the hemicycle-like receptacle seat 28 or drawing 4 d.

[0021] moreover, as an example of a gestalt of operation of another positioning means of the auxiliary lens-barrel 23 equipped with the image sensor 22 While carrying out press fit immobilization of the press fit bearing holes 30 and 30 formed in two guide shafts which popularity is won as shown in drawing 5 , and it is supported by seats 11 and 11, and are penetrated, and which are not illustrated at the auxiliary lens-barrel 23 After inserting the tooling holes 32 and 32 formed in the auxiliary lens-barrel 23 in the convex shafts 31 and 31 which project from posterior part wall surface 1b of the primary mirror cylinder 1 and positioning the auxiliary lens-barrel 23 concerned, Even if it fixes a setscrew 25 with screws to the screw-thread hole 26 of posterior part wall surface 1b of the primary mirror cylinder 1 through hole 23a, pin center,large \*\*\*\* to the optical-axis top of the auxiliary lens-barrel 23 can be performed like the case of an above-mentioned operation gestalt. Thus, by constituting, the axial presser-foot arm 13 can be made unnecessary.

[0022] Deformation implementation various by within the limits which is not limited to the example of the gestalt of operation which mentioned above and was shown in the drawing, and does not deviate from the summary is possible for this invention.

[0023] Although press fit immobilization was carried out at the press fit bearing holes 10 and 10 by the anterior part wall surface 1a side of the primary mirror cylinder 1, and popularity is won by the posterior part wall surface 1b side and it was made to carry out a bearing to seats 11 and 11 as an axial fixed means of the guide shafts 9 and 9 in this example The same operation can be acquired even if it is that carry out press fit immobilization by the posterior part wall surface 1b side at a press fit bearing hole, and receive the guide shafts 9 and 9 by the anterior part wall surface 1a side, and they carry out a bearing to a seat contrary to this.

[0024] Moreover, the lens barrel of this invention can be widely applied to the lens barrel of the electronic equipment by which a moving lens etc. is used, without restricting to video camera equipment.

[0025]

[Effect of the Invention] As explained above, the lens barrel by this invention While

carry out press fit support of the end side of the guide shaft with which two or more lens maintenance frames are held in the 1 side-attachment-wall side of a primary mirror cylinder, making it penetrate, being positioned on the receptacle seat of the other side-attachment-walls side of a primary mirror cylinder and penetrating the other end side of a guide shaft By receiving a guide shaft with an axial presser-foot arm, making it hold to a seat, and having positioned and attached the auxiliary lens-barrel to the posterior part before the primary mirror cylinder using the guide shaft which carries out a penetration protrusion Location \*\*\*\* to the optical-axis pin center, large of the auxiliary lens-barrel which makes a guide shaft a shaft basis and is attached to two or more lens maintenance frames and the lens barrel order section can be performed correctly and easily, and it is effective in the ability to obtain high optical-character ability.

[0026] Moreover, since the guide shaft is made into the shaft basis even if deformation etc. arises in a primary mirror cylinder, \*\*\*\* of an auxiliary lens-barrel can be prevented, and the optical-axis gap with a primary mirror cylinder and an auxiliary lens-barrel can be avoided.

[0027] Furthermore, since fabrication of a primary mirror cylinder and the two auxiliary lens-barrels is carried out to an exception object, respectively, the shaping metal mold of each lens-barrel is simplified, and they can manufacture metal mold cost cheaply.

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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] It is the perspective view of the separation condition of the lens barrel by this invention.

[Drawing 2] Similarly it is the sectional view of the assembly condition of the lens barrel by this invention.

[Drawing 3] It is the A-A line sectional view of drawing 2 .

[Drawing 4] It is drawing in case the receptacle seat of a guide shaft is a V character configuration.

b It is drawing in case the receptacle seat of a guide shaft is a U character title.

c It is drawing in case the receptacle seat of a guide shaft is a hemicycle-like.

d It is drawing in case the receptacle seat of a guide shaft is a square groove configuration.

[Drawing 5] It is the perspective view of another positioning structure of an auxiliary lens-barrel.

### [Description of Notations]

1 -- a primary mirror cylinder, 2 -- zoom lens device, 6 and 7, 8 -- lens maintenance frame, and 9 -- a guide shaft, 10 -- press fit bearing hole, 11 -- receptacle seat, and 12 -- a lid lens-barrel, 13 -- shafts presser-foot arm, a before [ 16 -- ] ball lens, and 17 -- an auxiliary lens-barrel, 18 -- tooling holes, 22 -- image sensor, and 23 -- an auxiliary lens-barrel, 24 -- tooling holes, 27 and 28, 29 -- receptacle seat, and 30 -- -- a press fit bearing hole, 31 -- convex shaft, and 32 -- tooling holes